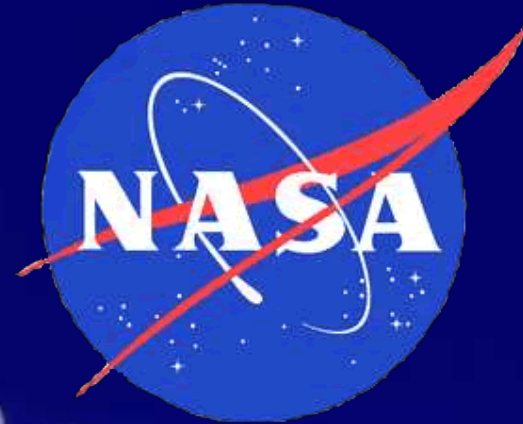




# INTERNATIONAL SPACE STATION



MISSION INTEGRATION OVERVIEW



# *Agenda*

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- ◆ Introduction
- ◆ Payload Integration Manager (PIM)
- ◆ ISS Payload Integration Process
- ◆ Integration Timeframes
  - Strategic, Tactical, and Operations
- ◆ Documentation
  - Joint Agreements, Integration Products
- ◆ Getting Manifested!
- ◆ Payload Tactical Plan
- ◆ Change Evaluation Process
- ◆ Summary



# *Introduction*

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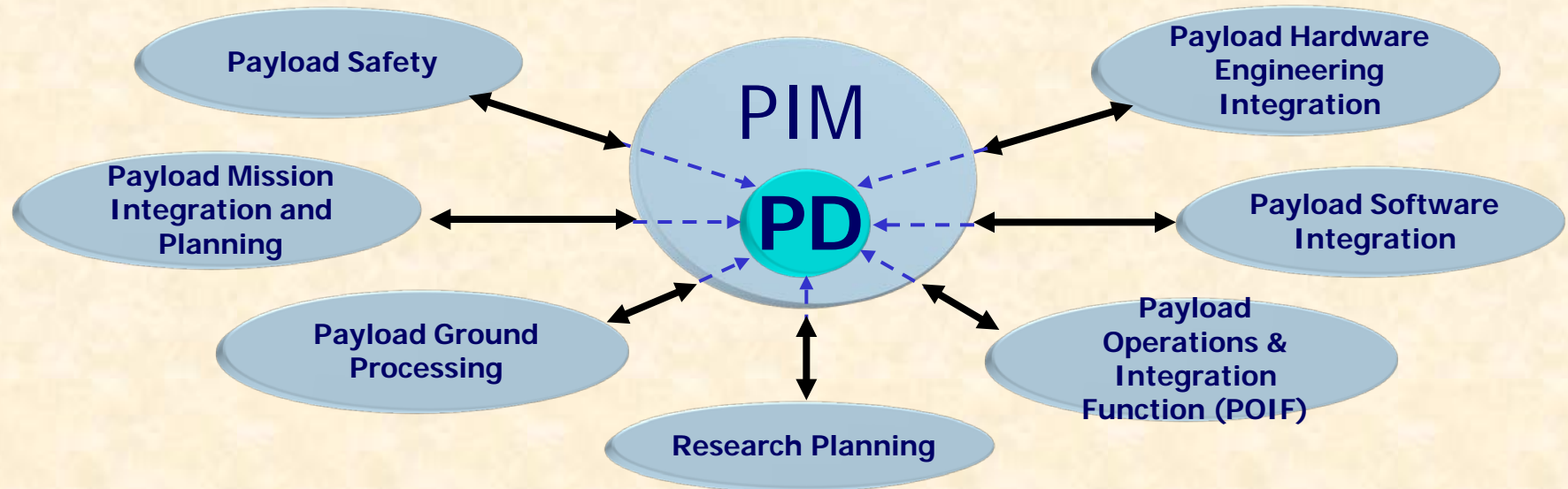
*This briefing provides a basic understanding of the ISS Payload Integration Process, including ISS-provided support to the payload and payload-provided data for the ISS*



# ***Payload Integration Manager***

## ◆ NASA Payload Integration Manager (PIM)

- Functions as the Payload Developer's primary interface to the ISS Program
- Serves as payload advocate – but also protects ISS Program Requirements

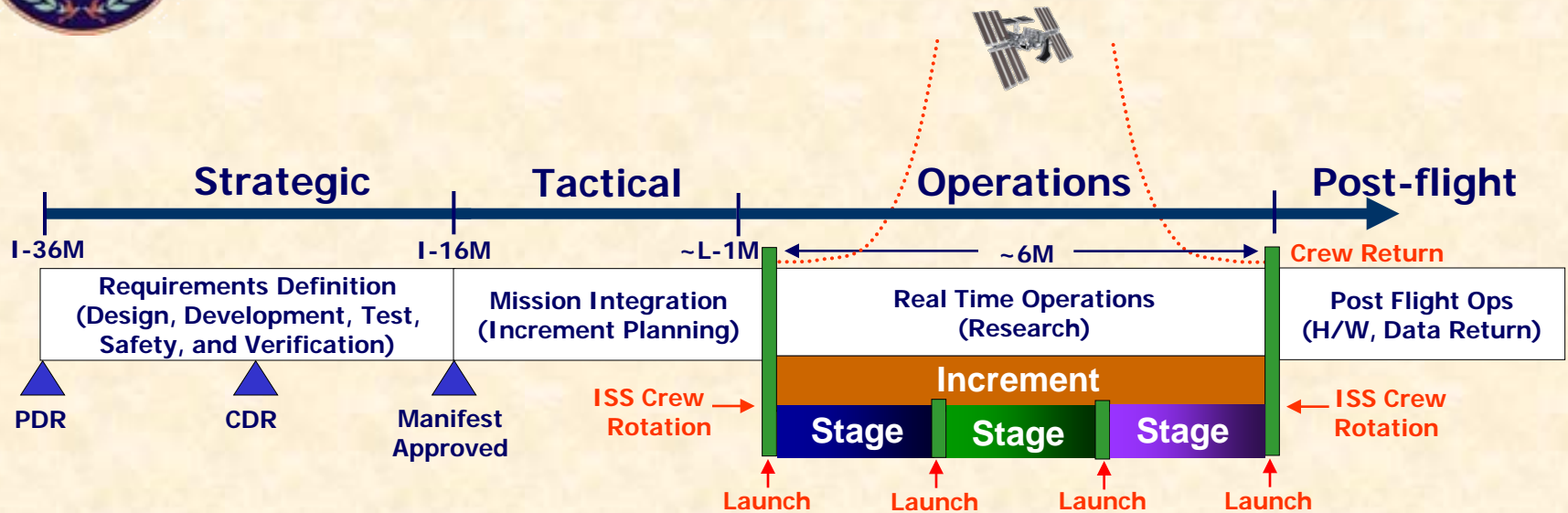


- Ensures payload requirements are accurately defined and documented
- Facilitates payload integration product development, delivery schedules, and communications with the ISS Program





# *ISS Payload Integration Process*

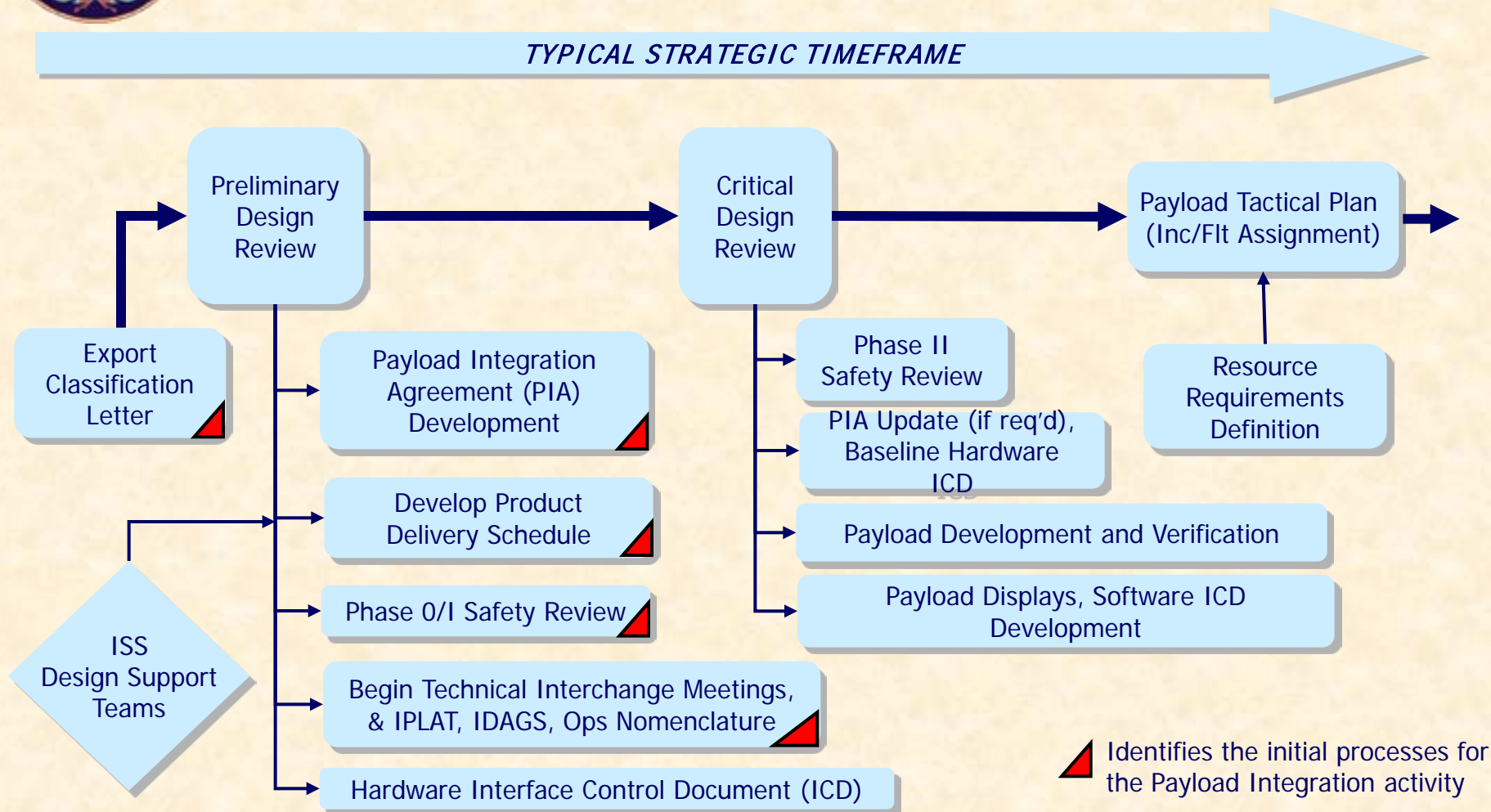


- **NASA PIMs provide integration leadership during all phases of the payload's life cycle**
  - **Strategic** – ISS integration requirements, products, and schedule development to ensure that an ISS compatible payload is built; support manifest process (payload data collection and feasibility assessments)
  - **Tactical** – represent PD interests to Increment and Flight-specific teams to ensure that integration and operations requirements are addressed; provide oversight for payload CoFR and verification submittals
  - **Operations** – assist with operations issue resolution between the PD and the Increment Payload Manager; maintains payload insight; and coordinates payload resupply or return requirements; assure payload CoFR and verification submittals during payload lifetime on-orbit
  - **Post-flight** – coordinate vehicle deintegration requirements; return of payload material from the landing site to the PD; and Lessons Learned submittals



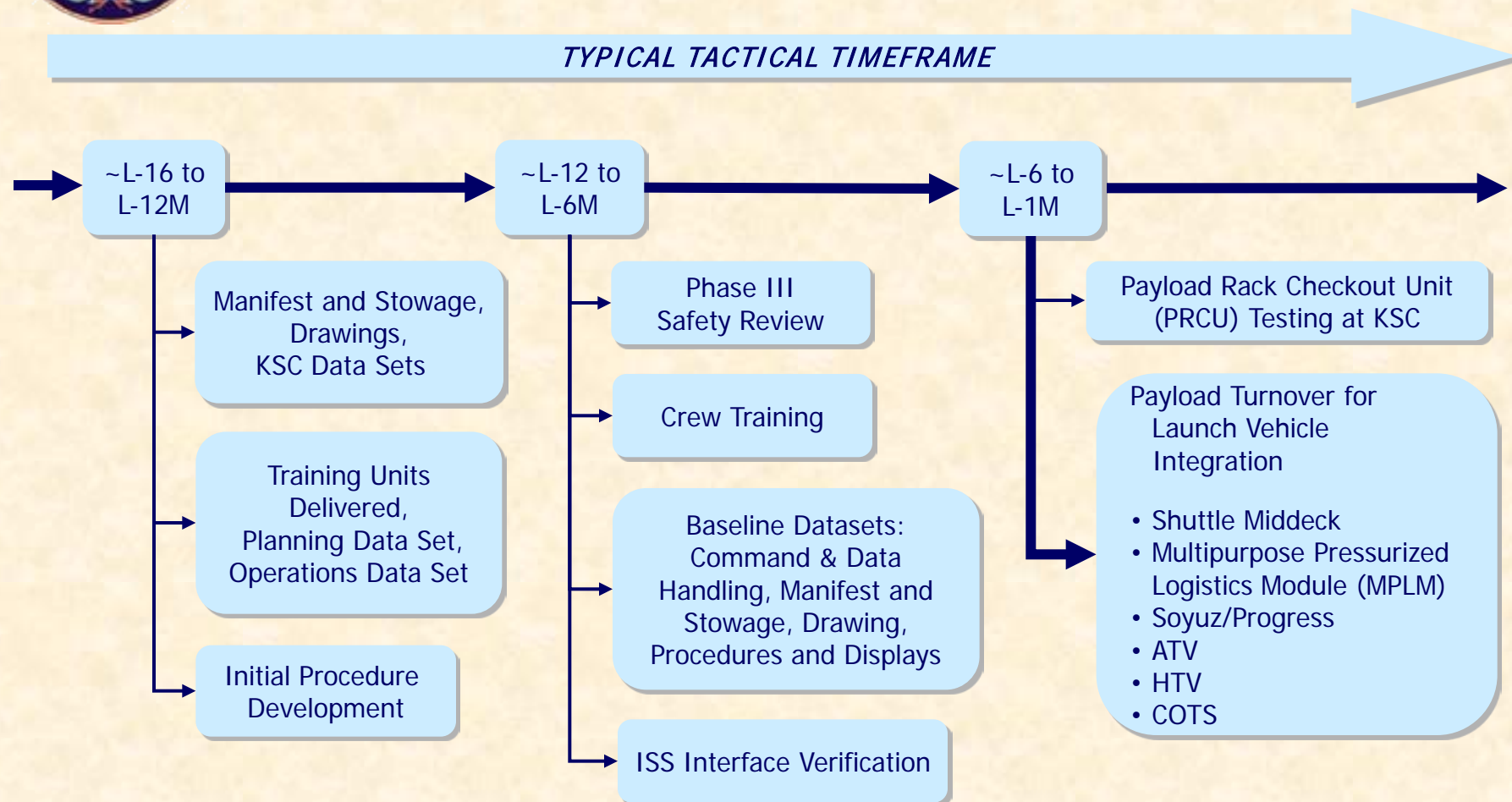
# Strategic Timeframe Overview

TYPICAL STRATEGIC TIMEFRAME





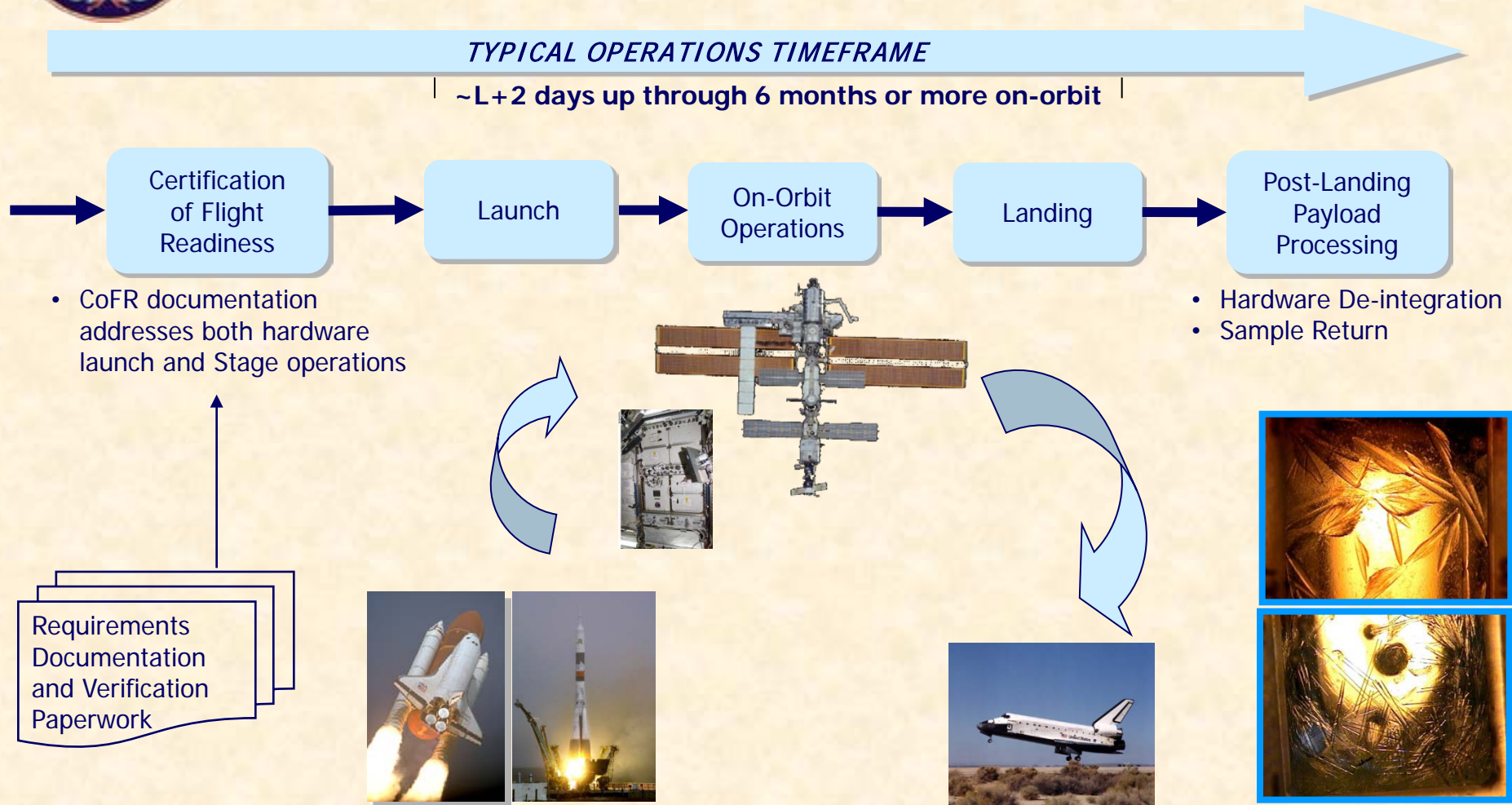
# *Tactical Timeframe Overview*



Note: EXPRESS Sub-rack payloads will have a compressed integration cycle.



# *Operations Timeframe Overview*







# Joint Agreements

## Negotiated Agreements

## *What they do for the Payload Developer*

Strategic

Unique PIA

Documents joint agreements to manage and execute roles and responsibilities for payload integration.

PIM Schedule

Documents negotiated product and hardware delivery dates.

Payload Unique ICD/  
Verification Requirements

Defines payload hardware and software interfaces with ISS. Details interface verification requirements.

Tactical

Payload Safety  
Data Package

Documents payload hazards, hazard controls, and hazard control verification.

Payload Tactical Plan

Documents detailed payload resource requirements.

Payload Unique  
Data Sets

Document detailed payload requirements for technical disciplines:

- Payload Training
- Ground Data Services
- Payload Planning Requirements
- Command and Data Handling
- Payload Operations
- KSC Support Requirements
- KSC Technical Requirements
- Payload Configuration and Drawings
- EVA/EVR
- Payload Procedures and Displays
- Manifest and Stowage



# Integration Products

## Payload Integration Manager Schedule



PDR Safety Phase 0/I CDR Safety Phase II Payload Manifested Safety Phase III Payload Pre-Ship CoFR

- Export Classification Letter
- Prelim Design Data Package
- Safety Data (Phase 0-I)
- Training Strategy TIMs

- Payload Integration Agreement (PIA)

- Critical Design Data Package
- Safety Data (Phase II)
- ICD/Verification Requirements

- Resource Requirements Definition
- Procedures & Displays DS (P)

- C&DH DS (P)
- KSC Support Rqmts DS
- KSC Technical Rqmts DS
- Ground Data Services DS
- Procedures & Displays (U)
- Payload Planning DS (P)
- Manifest/Stowage DS (P)
- Drawing DS (P)

- C&DH DS (U)
- Payload Trainer H/W & S/W
- Training Plans & Courseware
- Payload Planning DS (F)

- Interface Control Document (ICD) (U)
- Payload Verification Plan (PVP) (U)
- Requirements Exceptions

- Safety Data Pack

- Manifest/Stowage DS (U)
- Drawing DS (U)
- Integration Data Pack (IDP)

- C&DH DS (F)
- Procedures & Displays (F)

- CoFR Endorsement

### KEY

P – Preliminary  
U – Update  
F – Final



# *Getting Manifested!*

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## ***Payload Tactical Plan – IDRD Annex 5***

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- **Payload Tactical Plan – IDRD Annex 5**

- **Purpose:**

This document provides the integrated ascent, descent, and on-orbit resource requirements, research objectives , utilization priorities and on-orbit payload topologies of the utilization complement for a given set of Increments.

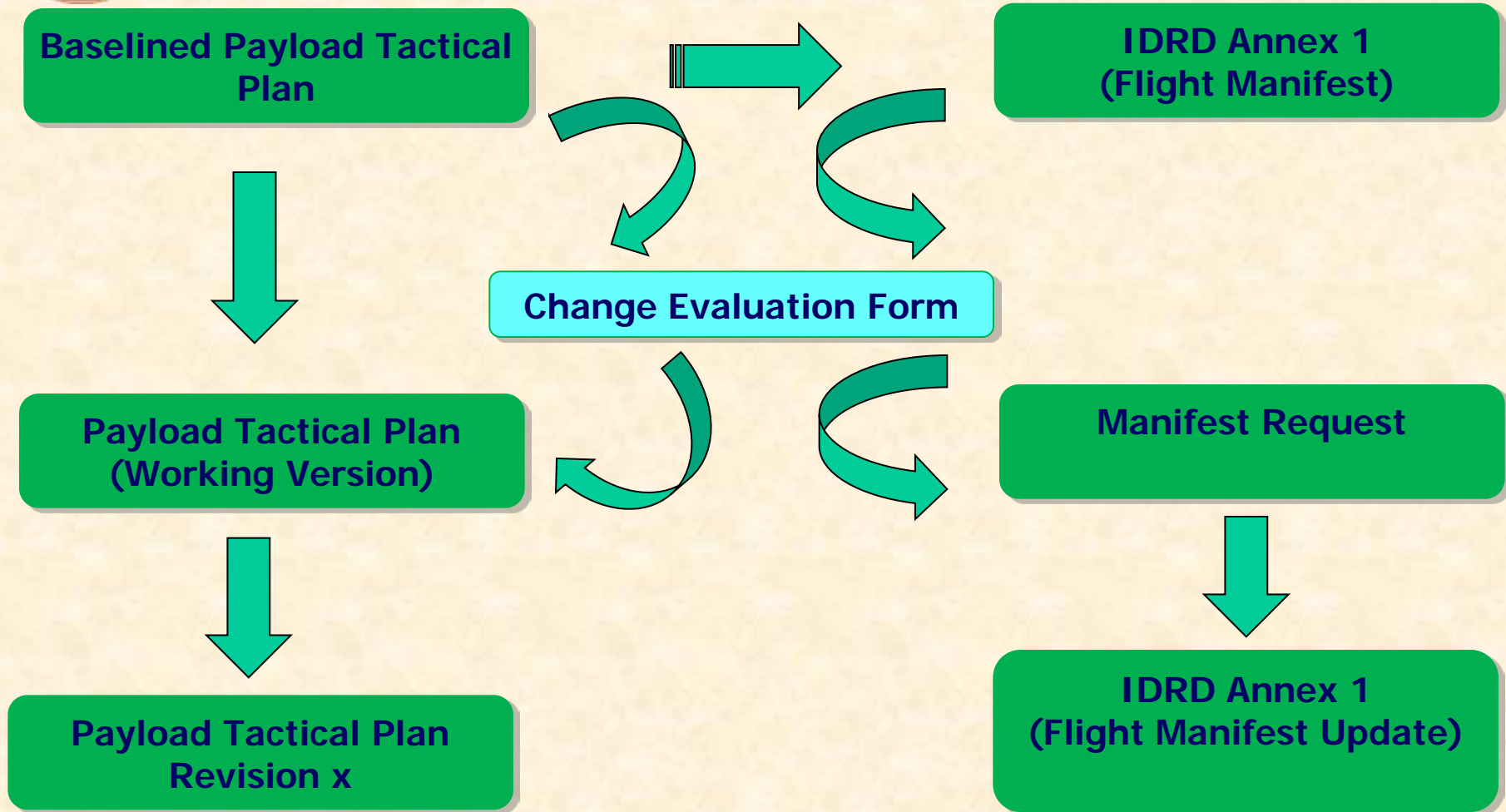
- **The Payload Tactical Plan is used as a top level requirements document to define resource requirements which can then be flowed to downstream payload documentation (e.g. Hardware and Software ICDs, Procedures, Planning Data, Stage Analysis, etc.)**

- **The Payload Tactical Plan is also used to communicate utilization resource requirements to the other ISS offices (e.g. Mission Integration, Vehicle Office, MOD, etc.)**





# Change Evaluation Form Process





## *Summary*

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- ◆ Our job is to increase the potential of Mission success for ISS payloads

Clearly defining and communicating requirements and expectations

*leads to*

Safe payload operations and successful research

*resulting in*

Maximum Science Return



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# ISS Payload Integration

## Back-up Charts



# ISS Payload Integration

## *Acronyms and Terms*

<p>ATV - Automated Transfer Vehicle</p> <p>AWG - Acoustics Working Group</p> <p>CDR - Critical Design Review</p> <p>CoFR - Certification of Flight Readiness</p> <p>C&amp;DH - Command and Data Handling</p> <p>DS - Data Set</p> <p>EDMS - Electronic Data Management System</p> <p>EEE - Electrical, Electronic, and Electromechanical</p> <p>EXPRESS - Expedite the Processing of Experiments to Space Station</p> <p>FLT - Flight</p> <p>GSRP - Ground Safety Review Panel</p> <p>HFIT - Human Factors Integration Team</p> <p>H/W - Hardware</p> <p>HTV-IIA - JAXA launch vehicle</p> <p>ICD - Interface Control Document</p> <p>IDP - Integration Data Pack</p> <p>Inc - Increment</p> <p>IP - Internet Protocol</p> <p>IPLAT - ISS Payload Label Approval Team</p> <p>ISS - International Space Station</p> <p>JSC - Johnson Space Center</p> <p>KSC - Kennedy Space Center</p> <p>L-6 - Launch minus (<i>month or day</i>)</p> <p>MPCB - Multilateral Payload Control Board</p>	<p>MPLM - Multipurpose Pressurized Logistics Module</p> <p>MSFC - Marshall Space Flight Center</p> <p>NPOCB - NASA Payload Operations Control Board</p> <p>NSTS - National Space Transportation System</p> <p>OpNom - Operations Nomenclature</p> <p>PARC - Payload Activity Requirements Coordinator</p> <p>PCB - Payload Control Board</p> <p>PD - Payload Developer</p> <p>PDL - Payload Data Library</p> <p>PDR - Preliminary Design Review</p> <p>PECP - Payload Engineering Control Panel</p> <p>PIA - Payload Integration Agreement</p> <p>PIM - Payload Integration Manager</p> <p>PIMS - Payload Information Management System</p> <p>PMIT - Payload Mission Integration Team</p> <p>PODF - Payload Operations Data File</p> <p>POIC - Payload Operations Integration Center</p> <p>POIF - Payload Operations Integration Function</p> <p>POIWG - Payload Operations Integration Working Group</p> <p>PSCP - Payload Software Control Panel</p>	<p>PSRP - Payload Safety Review Panel</p> <p>PVP - Payload Verification Plan</p> <p>RPWG - Research Planning Working Group</p> <p>SAR - System Acceptance Review</p> <p>SR&amp;QA - Safety Requirements and Quality Assurance</p> <p>S/W - Software</p> <p>TIM - Technical Interchange Meeting</p> <p>TReK - Telescience Resource Kit</p> <p>User-ID - User-identification</p> <p>URC - User Requirements Collection</p> <p>US PODFCB - US Payload Operations Data File Control Board</p> <p>VPN - Virtual Private Network</p> <p>IDRD- Increment Definition and Requirements Document</p> <p>I-36M - Increment minus 36 months</p> <p>L-6M - Launch minus 6 months</p> <p>Increment - ISS period supporting crew rotation. The duration of an Increment is the time period from the launch of a designated Expedition crew to the undocking of the return vehicle for that Expedition crew.</p> <p>Questionnaire - Web-based software data entry tool used to collect payload resource requirements in support of the RPWG manifesting process</p> <p>Stage - ISS timeframe between manned vehicle dockings</p>
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